

inadequate. Active water cooling systems have been used with a large external cooling body which serves as a heat exchanger. However, this disadvantageously increases the amount of space required for the computer. In addition, external connections for the supply and discharge of water have to be provided on the computer casing. This always involves the risk of water escaping. Accordingly, the present invention provides a computer in which a housing or a casing 1 of an industrial computer 16 has a display 4 of the computer bordered by a frame 2. Further, a cooling passage 5 is provided in the frame 2. Further, the cooling passage 5 is formed by the frame 2 itself.

Electronic components 10, such as a CPU, are provided on the interior 18 of the casing. A fluid-conducting communication 13 is provided between the passage 5 and the electronic component 10.

Thus, by the present invention, a computer is provided that resolves the problems of the prior art by having the electronic component inside of the casing cooled through a fluid-conducting communication between the electronic component and the passage that is arranged in the frame bordering the display, the frame itself forming the passage. This resolves the problem of passive heat exchangers that employ internal and external cooling ribs, which are frequently inadequate. This further resolves the problem of active water cooling systems that require a large external cooling body and external connections for the supply and discharge of cooling fluid.

The present invention is primarily reflected by independent claim 28. This claim requires a computer that has a casing. The casing has a display, and the display is bordered by a frame. Furthermore, claim 28 requires that the frame have a passage arranged therein with a cooling fluid in the passage. Further, claim 28 requires that the frame itself forms the passage for the cooling fluid. Further, claim 28 requires a fluid-conducting communication being provided between the passage and at least one electronic component, the electronic component being inside of the casing. Thus, claim 28 clearly reflects the advantages of the present invention over the prior art.

The present invention is further reflected by independent claim 53. Claim 53 reflects each of the same limitations as claim 28. However, claim 53 recites a plurality of electronic components. Dependent claims 29-48 and 54-56 present further limitations to the present invention that will be discussed in detail below.

The References Cited by the Examiner

The Examiner made primary reference to von Gutfeld. Von Gutfeld is directed to a case for portable computers for enhanced heat dissipation. As can be seen from the description of the related art in column 1 of von Gutfeld, the concerns with prior art methods of dissipating heat in laptop computers are several. First, hinged heat pipes have been placed within the electronic component part of the case, with the opposite ends of the pipes connected to a member behind the display panel. The areal surface dimension is relatively large for heat dissipation. However, von Gutfeld presents this solution as being a complicated configuration, relatively costly and requiring the dissipation of vaporization heat within one end of the pipe to a relatively cooler region. Further, the heat sinking required for heat pipes tends to be impractical for laptop computers because of the limited available space.

Accordingly, von Gutfeld has the object of providing a casing for housing a computer providing enhanced heat dissipation to the ambient atmosphere more simply and inexpensively. The solution of von Gutfeld is, generally, to provide relatively simple and inexpensive design changes with minimal or no additional parts.

A first concept of von Gutfeld provides the case of metal with a continuum of closely spaced ribs which are part of and are formed from the sides and bottom of the case so as to function as heat fins. Noting drawing Figs. 1-2, case 1 has ribs 2 protruding at the outer surface of the case for dissipating heat from the computer. Also shown is a display screen 3 and a bottom plate 4. As noted beginning at line 30 of column 3, the display 3 and peripheral edges of the bottom 4 are extended to cover the top and bottom of the ribs 2. As noted beginning at line 40 of column 3, "the top portion 3 contains the display and does not require cooling though this portion of the case 3 could also be ribbed."

A second embodiment of von Gutfeld involves selective positioning of a microprocessor with respect to the sides of the case, and a third embodiment involves an insulating layer on the bottom of the laptop computer.

Akiyama discloses a cooling device for a liquid crystal panel. A liquid crystal panel is mounted on a container 12. A surrounding wall 12a surrounds the container 12. Outside circulating passages 18 are provided on both sides of cooling device 10 of the second embodiment. As can be seen from Fig. 2, a polarizing plate 30 and a liquid crystal panel 40 are mounted on opposite sides of container 12.

As can be seen from the Summary of the Invention of Akiyama, the object is to provide a cooling device which may effectively cool a liquid crystal panel with a cooling liquid. The cooling device comprises the container described above, with the liquid crystal panel attached to one of the sides.

Claims 28 and 53 Clearly Distinguish over Both von Gutfeld and Akiyama

As discussed above, claim 28 requires a computer comprising a casing having a display which is bordered by a frame. The Examiner cites von Gutfeld as having a display 3 bordered by a frame. Reference number 2 in von Gutfeld, however, refers to ribs. As discussed above, in von Gutfeld, the display extends over the ribs of the casing. While ribs could be provided on the display 3 in von Gutfeld, it is indicated that the display does not need cooling. In any case, it is clear that von Gutfeld fails to disclose a computer having a casing with a display that is bordered by a frame, particularly wherein the frame has a passage arranged therein with a cooling fluid in the passage.

The Examiner acknowledges that von Gutfeld does not teach the frame having a passage arranged therein with a cooling liquid in the passage, wherein the frame itself forms the passage for the cooling fluid. However, the Examiner goes on to cite Akiyama.

However, Akiyama does not cure the defects of von Gutfeld. Akiyama does not disclose a display bordered by a frame, the frame having a passage arranged therein with a cooling fluid in

the passage. Rather, in Akiyama the display 40 is placed on the casing 12, which has the cooling fluid passage therein. The display is not bordered by a frame having the cooling fluid passage.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to provide the frame of von Gutfeld with an alternate means of cooling electronic components, such as by a fluid passages within a frame, as taught by Akiyama, because the device of Akiyama would provide a more efficient and enhanced means of cooling electronic components in the computer of von Gutfeld. However, this conclusion by the Examiner is not supported by Akiyama and von Gutfeld.

It should primarily be noted that even if one of ordinary skill in the art considered adopting the cooling container of Akiyama, which is provided for a liquid crystal panel, with von Gutfeld, the present invention would not result. The present invention requires the frame, which itself forms a passage for the cooling fluid, to border the display of the computer casing. Even if the container 12 were used to replace (somehow) the cooling arrangement of von Gutfeld, a frame having a cooling passage therein that borders the display would not be the result. The teaching of Akiyama is to place a container 12 adjacent to the display 40; i.e. the display 40 is provided on one side of the casing and it does not border the display.

Even if one of ordinary skill in the art adopted the container or casing 12 for cooling the display 3 of von Gutfeld, this does not serve to cool the electronic components inside the computer casing of von Gutfeld. It would just serve to cool the display. The teaching of Akiyama is not to cool electronic components of a computer, but to cool a display.

Secondly, one of ordinary skill in the art would find no suggestion from the references themselves to combine them. Moreover, one of ordinary skill in the art would in fact find a teaching away from making a combination. Von Gutfeld specifically states that the top portion 3 that contains the display does not require cooling. Note lines 41-42 of column 3. Akiyama teaches a cooling device for a liquid crystal panel. However, such is clearly not necessary in von Gutfeld, because the display does not require cooling. Thus there is no motivation for one of ordinary skill in the art to adopt a cooling device for a liquid crystal panel for the display of von Gutfeld. The teaching of Akiyama is not with respect to electronic components generally, or

electronic components of computers specifically, but for a liquid crystal panel. Thus the combination proposed by the Examiner fails for a complete lack of motivation to one of ordinary skill in the art to adopt the cooling arrangement of Akiyama with von Gutfeld.

Accordingly, it is respectfully submitted to be clear that, for both independent claims 28 and 53, the Examiner has failed to present a prima facie case of obviousness. It is not obvious to combine these two references, because there is no suggestion of such combination, and only suggestion that such combination should not be made. The Examiner's conclusion that Akiyama would provide more efficient and enhanced cooling is based upon a hindsight view of what might be appropriate for von Gutfeld; von Gutfeld itself states that no further cooling of the display is required. Even if combined, the present invention does not result.

The Dependent Claims Further Distinguish over Akiyama and von Gutfeld

With respect to claim 29, the Examiner states that passage 18 extends around frame 12a. However, frame 12a does not border the display but is placed on one side of the display.

With respect to claims 31 and 32, it is noted that the process of making the frame from an extrusion, or the entire casing from an extrusion, results in a physically different frame or casing.

With respect to claim 36, the Examiner cites connected portions 25 of Fig. 16 of Akiyama. However, 25 is a charging hole for initially charging the coolant into a space 11. The space is closed by a plug 26. Thus Akiyama fails to suggest fluid-conducting communication comprising connecting portions that project into the interior of the casing and are provided on the passage in fluid communication with the passage. The single charging hole 25 is closed by a plug 26. Further, it does not project into the interior of the casing. Nor is it in fluid communication with a passage with cooling fluid in the passage, as once the cooling fluid is provided in the passage, the hole 25 is closed by plug 26.

Claim 37 depends from claim 36, and requires exactly two connecting portions. There is no reason in Akiyama to have two holes 25, despite the Examiner's citation. Nor is there any reason to have holes for both ingress and egress, despite the Examiner's assertion. Nor is there

any reason to locate the connecting portions as recited in claim 38, despite the Examiner's assertion. Hole 25 is not used for the flow of the fluid.

With respect to claim 42, the Examiner cites a pump 60 of Akiyama. However, it is noted that von Gutfeld specifically seeks to avoid such a complicated arrangement and employs passive heat exchange. Thus, this would not be obvious with von Gutfeld.

With respect to claim 54, there is no disclosure or suggestion from either reference of having a plurality of electronic components being disposed on a non-display side of a display. The Examiner states that the display 3 has a viewing side and a non viewing side, and that the electronic components are disposed on the non-display side. The Examiner references Figs. 3 and 4 of von Gutfeld. However, there is no indication of such from Figs. 3 and 4 of von Gutfeld. All that von Gutfeld states is that von Gutfeld is directed to a laptop type of computer and that the top portion 3 contains the display. In laptops, the display is face down, and pivots upward to a usable position. This would tend to suggest that the non-display side would face upward, away from the electronic components as shown in Fig. 3. There is no basis from von Gutfeld for the Examiner to make this rejection of claim 54.

Applicants reserve their rights to address the additional limitations on the various dependent claims that have not been specifically discussed above.

Conclusion


From the above, it is respectfully submitted to be clear that the present invention as set forth in claims 28-56 clearly patentably distinguishes over both von Gutfeld and Akiyama. Indication of such is respectfully requested.

In view of the above remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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